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***Scleroderris* Canker of
Northern Conifers**

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Hosts

Scleroderris canker has been found on Scotch, red, and jack pines in the United States. In addition, white and lodgepole pines and white and black spruces have been infected in Canada. In Europe, known hosts are Austrian, Corsican, Swiss mountain, Swiss stone, Virginia, and maritime pines; Norway spruce; and Douglas fir.

Life History

Primary infection is by wind-blown ascospores. These are disseminated during moist weather from April to October, although the major spore discharge is during June and July. The spores infect through buds or needles. Infected branch tips are usually dead the following summer (fig. 1). The fungus grows down the branch and into the main stem of the tree where a canker commonly forms. On young seedlings the stem is quickly girdled, with resulting mortality. A few months after an infected branch dies pycnidia appear near the base of dead needle fascicles (fig. 2). Asexual

Scleroderris canker, caused by the fungus *Scleroderris lagerbergii* Gremmen, has caused extensive mortality in conifer plantations and forest nurseries in the northern United States and Canada in recent years. Losses have been most severe in red and jack pine plantations.

It is suspected that *Scleroderris* canker is not native to North America, but it has been here for many years. The causal fungus was identified in Canada in 1962 and in the United States in 1964.

Distribution

Scleroderris canker is present in the northern portions of Michigan, Wisconsin, Minnesota, and New York and is also widely distributed throughout Ontario and Quebec. Short growing seasons and heavy snowfall seem to favor its development.

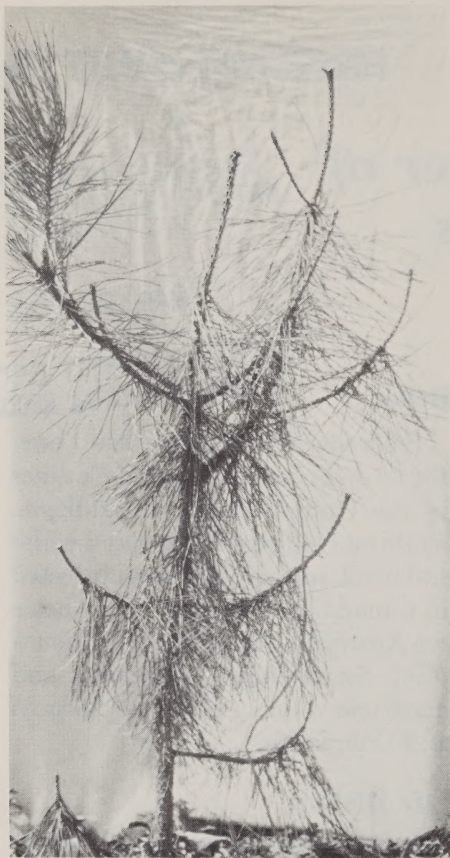
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Figure 1.—Red pine with multiple branch tips infected by *S. lagerbergii*.

spores ooze out of these pycnidia during wet weather from April to October. These spores are transported by rain splash to nearby branches, spreading the infection on the individual tree. Apothecial fruiting bodies appear in early summer on branches that have been dead for 1 or 2 years (fig. 3). The apothecia are also commonly found at the base of dead needle fascicles and are often found in association with the pycnidial stage. Ascospores mature in the apothecium by late April and

are discharged following rainfall from then until October.

Man contributes to the long-distance dissemination of *Scleroderris* canker through the planting of infected nursery stock.

Symptoms and Damage

The first symptom of *Scleroderris* infection in plantations is usually the dieback of buds and the previous season's growth on one or more branches. The fungus grows through the branch until it reaches the main stem of the tree. Young trees are girdled quickly and die within a few months. On larger trees branch infections may be arrested before reaching the main stem, by such things as competition from



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Figure 2.—Pycnidia of *S. lagerbergii*. Spores are rain splashed to nearby branches from April to October.



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Figure 3.—Apothecial fruiting bodies of *S. lagerbergii*. Wind-disseminated ascospores are discharged during moist weather from late April until October.

saprophytic fungi, or breakage of infected branches by heavy, wet snow. Stem infections on large trees frequently result in a canker (fig. 4). This canker may eventually be overgrown but usually will deform the stem. A characteristic yellow-green discoloration is commonly observed in the cambial zone of recently killed tissue. Infected needles on red pine nursery stock turn orange at the base during early May. These needles are very loose and can easily be removed from the seedling.

By midsummer most of the infected needles turn brown.

In Quebec, the chief symptoms of *Scleroderris* infection on black spruce are dead or dying stems, leaders, and branches.

The time of initial infection affects the severity of plantation damage. A high percentage of trees may be killed in stands heavily infected during the first 5 years after planting. Infections that start in plantation trees 5 to 6 feet in height cause only minor damage. Although the



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Figure 4.—Stem canker on red pine caused by *S. lagerbergii*.

lower branches of these trees are killed, the disease normally causes little tree mortality.

Serious damage has been mostly limited to red, jack, and Scotch pine plantations. The disease is primarily one of planted trees, although natural stands are sometimes infected. The problem in North America is most serious in red and jack pine plantations because large acreages have been planted to these species. A recent Lake States survey showed that *Scleroderris* canker was the main identifiable cause of tree mortality in infected 6- to 10-year-old red pine plantations.

Control

Scleroderris canker in plantations can be best controlled by planting disease-free stock in areas where no

infected trees are present. Ideally, nursery stock should be produced in areas where *Scleroderris* is absent. Fall planting should be discouraged if the possibility of infected planting stock exists. Infected seedlings cannot be recognized until the following spring. Planting of diseased stock can result in serious plantation losses in future years by providing a source of inoculum for infecting nearby trees. Thus, establishing new plantations in areas where *Scleroderris*-infected trees are present should be avoided.

Several fungicides are being tested for the prevention of seedling infection at nurseries located in *Scleroderris* areas. Some of these chemicals are highly effective against *S. lagerbergii* but are not yet registered for this use.

Evidence of resistance to *Scleroderris* canker has been found in jack pine in Ontario. If this trait is confirmed, production of resistant trees eventually may be possible through selection and propagation.

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